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Respectfully Submitted,

Mark J. Murphy
Registration No. 34,225
Date: May 5, 2008

COOK, ALEX, McFARRON,
MANZO, CUMMINGS & MEHLER, Ltd.
200 West Adams Street
Suite 2850
Chicago, Illinois 60606
(312) 236-8500

Customer No: 26568

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(12) **United States Patent**
Takayama et al.

(10) **Patent No.: US 7,245,018 B1**
(45) **Date of Patent: Jul. 17, 2007**

(54) **WIRING MATERIAL, SEMICONDUCTOR DEVICE PROVIDED WITH A WIRING USING THE WIRING MATERIAL AND METHOD OF MANUFACTURING THEREOF**

(75) Inventors: **Toru Takayama**, Kanagawa (JP); **Keiji Sato**, Kanagawa (JP); **Shunpei Yamazaki**, Tokyo (JP)

(73) Assignee: **Semiconductor Energy Laboratory Co., Ltd.** (JP)

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(58) **Field of Classification Search** 257/763, 257/764, 770; 438/648, 649, 656, 683, 685
See application file for complete search history.

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Primary Examiner—Hung Vu
(74) *Attorney, Agent, or Firm*—Cook, Alex, McFarron, Manzo, Cummings & Mehler, Ltd.

(57) **ABSTRACT**

A semiconductor device having good TFT characteristics is realized. By using a high purity target as a target, using a single gas, argon (Ar), as a sputtering gas, setting the substrate temperature equal to or less than 300° C., and setting the sputtering gas pressure from 1.0 Pa to 3.0 Pa, the film stress of a film is made from -1×10^{10} dyn/cm^2 to $1\times^{10}$ dyn/cm^2. By thus using a conducting film in which the amount of sodium contained within the film is equal to or less than 0.3 ppm, preferably equal to or less than 0.1 ppm, and having a low electrical resistivity (equal to or less than 40 μΩ·cm), as a gate wiring material and a material for other wirings of a TFT, the operating performance and the reliability of a semiconductor device provided with the TFT can be increased.

46 Claims, 26 Drawing Sheets